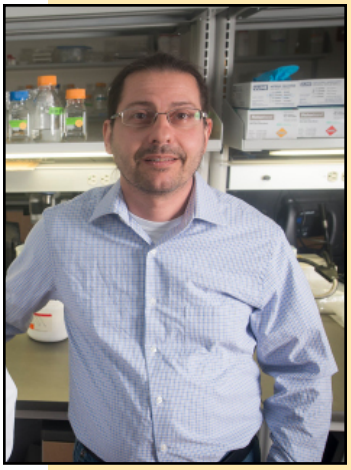

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Education

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Key Interests

Neuroscience | Cognition | Behavior | Electrophysiology | Molecular Biology | Synaptic Plasticity | Hippocampus | Memory | Aging

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SELECT PUBLICATIONS

- Dumas, T. (2020). *If food could talk: Stories from 13 precious foods endangered by climate change*. Koehler Books.
- Keith, R. E. *et al*. (2021). Behind the scenes: Are latent memories supported by calcium independent plasticity? *Hippocampus*.
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Research Focus

The laboratory for Physiological and Behavioral Neuroscience in Juveniles (PBNJ) focuses on the late postnatal changes in brain structure and function in relation to the development of learning and memory abilities, primarily in rodents. We take this approach as a model to understand normal and pathological brain development and also to better understand how the brain is altered in senescent individuals suffering memory deficits, ranging from those with mild cognitive impairment to Alzheimer's disease patients.

Current Projects

- Application of in vivo electrophysiology in behaving animals combined with pharmacology and immunohistochemistry in thin brain sections to better understand late postnatal changes in excitatory synaptic transmission, neuronal circuit oscillations/single unit activities. This approach is taken with the premise that the first processes to become impaired in aging are the last processes to mature during development.
- Generation of transgenic mice that express chimeric GluN2 subunits in forebrain NMDA receptors and investigation of the impacts of these mutations on hippocampal synaptic plasticity and spatial learning and memory. These mice allow for separation of impacts of NMDA receptor-dependent calcium conductance and direct intracellular protein signaling on the processes by which neurons encode information/experience and store it for the long-term.
- Investigation of tardigrades' unique ability to achieve ametabolic cryptobiosis and metabolic impacts on memory storage. Tardigrades can be threat conditioned and this behavioral assay will be combined with cryptobiosis to see how memories are affected by ametabolism (degradation, no impact, prolongation/stasis). This project will be extended by expression of fluorescent calcium indicators in behaving animals to better understand the neural circuitries involved in learning and memory and their resilience to cryptobiosis.